

Newsletter Physics 04/25

Department News

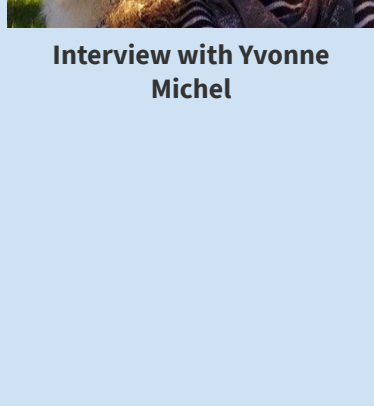
Research Highlights

Events

New colleagues



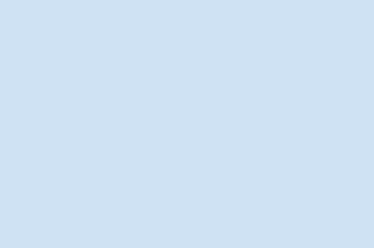
News from the Department



Interview with Yvonne Michel

The PR team has continued the series of interviews with key people in the Physics Department, this time with Yvonne Michel. She describes herself as a "little series junkie" and a "fast book reader". As a child, she always wanted to do something with horses. And her tip to the students: "Read your study and examination regulations. At least once." Read the full interview (in German) that has been conducted by Sarah Zajusch.

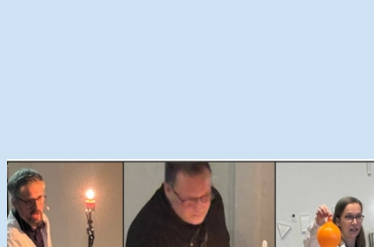
Die Werbetafel hat die Interviewreihe mit Schlüsselpersonen im Physik Fachbereich fortgesetzt, diesmal mit Yvonne Michel. Sie bezeichnet sich selbst als „kleinen Serienjunkie“ und „schnelle Bücherleserin“. Als Kind wollte sie schon immer etwas mit Pferden machen. Und ihr Tipp an die Studenten: „Lest eure Studien- und Prüfungsordnung. Wenigstens einmal.“ Mehr findet ihr im vollständigen Interview, das von Sarah Zajusch geführt wurde.

[Interview](#)


Meet the Fachschaft

A spin-off of the "Meet the Prof" series has gone online! In "Merle Rake", the three student representatives Merle Rake, Nadja Voermanek and Marvin Kuckert introduce themselves. What is a student council good for and what makes the student council of the Department of Physics so special? First-year students and prospective students in particular can only benefit from the experience of older students. Small spoiler: In addition to university politics, course evaluations and event organisation, there is definitely still time for fun. Editing, direction and moderation: Mette Leipholz, Helen Romanski, Sarah Zajusch.

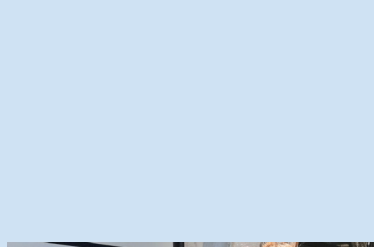
Die Ein Spin-off der Serie "Meet the Prof" ist online gegangen! In "Meet the Fachschaft" stellen sich die drei Fachschafter*innen Merle Rake, Nadja Voermanek und Marvin Kuckert vor. Wofür ist eine Fachschaft da und was zeichnet die Fachschaft des Fachbereichs Physik besonders aus? Gerade Studienanfänger*innen und Interessierte können von der Erfahrung älterer Studierender nur profitieren. Kleiner Spoiler: Der Spaß kommt neben der ganzen Hochschulpolitik, den Evaluations und der Veranstaltungsorganisation garantiert nicht zu kurz. Schnitt, Regie und Moderation: Mette Leipholz, Helen Romanski, Sarah Zajusch.

[Interview](#)


Noeks conference in Marburg

The 17th International Conference on Nonlinear Optics and Excitation Kinetics in Semiconductors (NOEKS) will be held in Marburg on 8-12 September. The has the outstanding tradition of bringing together leading scientists in the field of semiconductor optics. The focus of this year's conference will lie on exciton dynamics and transport in 2D materials, energy and charge transfer in 2D perovskites, strong light-matter coupling, strongly correlated physics, 2D magnets, etc. Martin Koch and Enrique Castro-Camus are organizing the conference and Ermin Malic is the programme committee chair. Submission will be accepted until beginning of May.

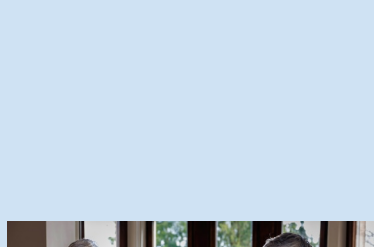
Die 17. Internationale Konferenz über Nichtlineare Optik und Anregungskinetik in Halbleitern (NOEKS) findet vom 8. bis 12. September in Marburg statt. Sie hat die hervorragende Tradition, führende Wissenschaftler auf dem Gebiet der Halbleiteroptik zusammenzubringen. Der Schwerpunkt liegt bei der diesjährigen Konferenz auf Exzitondynamik und Transport in 2D-Materialien, Energie- und Ladungstransfer in 2D-Perovskiten, starke Licht-Materie-Kopplung, stark korrelierte Physik, 2D-Magneten usw. Martin Koch und Enrique Castro-Camus organisieren die Konferenz und Ermin Malic ist verantwortlich für das Konferenzprogramm. Einreichungen werden bis Anfang Mai angenommen.

[Homepage](#)


Physics experiments for primary school pupils

On March 24, around 60 primary school pupils from Marburg and Cölbe visited the Department of Physics. Catrin Ellenberger, Georg Otto and Tobias Breuer captivated the young audience with a lively presentation full of experiments and interactive demonstrations on the topic of "Air and Light". From ultra-cold balloons and exploding chocolate marshmallows to a giant rainbow right in the lecture hall – the show sparked wide-eyed wonder. Even invisible objects suddenly became visible – spectacular effects in physics! After the presentation, the children had the opportunity to ask questions about the experiments and other physics-related topics. We're confident that this visit helped ignite a spark of curiosity and enthusiasm for science – and perhaps even inspired some future physicists!

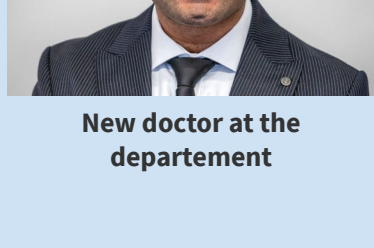
Am 24. März haben rund 60 Grundschülerinnen und Grundschüler aus Marburg und Cölbe den Fachbereich Physik besucht. Catrin Ellenberger, Georg Otto und Tobias Breuer begeisterten die jungen Gäste mit einem lebendigen Vortrag voller Experimente und Mitmachaktionen rund um das Thema „Luft und Licht“. Dabei sorgten ultrakalte Luftballons, explodierende Schokoküsse und ein riesiger Regenbogen mitten im Hörsaal für große Augen. Selbst Unsichtbares wurde plötzlich sichtbar gemacht – Physik zum Anfassen und Staunen! Im Anschluss hatten die Kinder Gelegenheit, ihre Fragen zu den Experimenten und zur Welt der Physik loszuwerden. Wir sind zuversichtlich, dass dieser Besuch die Neugier auf Naturwissenschaften geweckt und vielleicht den Grundstein für zukünftige Forscherinnen und Forscher gelegt hat.



Girls Day at the department

The Physics department's participation in the nationwide Girls' Day has become a tradition. This year, 11 schoolgirls aged 12 to 14 from Marburg and the (wider) surrounding area took part in the event. The programme was organised by Dr Catrin Ellenberger, head of the Didactics working group, who accompanied the girls throughout the day. During the welcome session Dr Catrin Ellenberger and Franziska Hüppe, a research assistant in the Structure and Technology Research Laboratory, gave the participants an initial insight into studying physics and the work of scientists in the Department of Physics at the Renthof. For the second part of the event, which was dedicated entirely to science and research, they travelled by bus to the Lahnberge. Here, they were again divided in to small groups to visit a research group.

Die Teilnahme des Fachbereichs Physik am bundesweiten Girls' Day hat mittlerweile Tradition. In diesem Jahr nahmen 11 Schülerinnen im Alter von 12 bis 14 Jahren aus Marburg und der näheren und weiteren Umgebung teil. Organisiert wurde das Programm von Dr. Catrin Ellenberger, Leiterin der Arbeitsgruppe Didaktik, die die Mädchen durch den Tag begleitete. Bei der Begrüßung gaben Dr. Catrin Ellenberger und Franziska Hüppe, wissenschaftliche Mitarbeiterin im Forschungslabor Struktur und Technik, den Teilnehmerinnen einen ersten Einblick in das Physikstudium und die Arbeit der Wissenschaftlerinnen und Wissenschaftler am Fachbereich Physik am Renthof. Für den zweiten Teil der Veranstaltung, der ganz im Zeichen von Wissenschaft und Forschung stand, fuhren sie mit dem Bus auf die Lahnberge. Hier wurden sie wieder in Kleingruppen aufgeteilt, um eine Forschungsgruppe zu besuchen.

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Farewell to Carmen Schweetz

It was with a smile and a tear in her eye that Dr Carmen Schweetz celebrated the beginning of her retirement with around 35 colleagues from the department and from the university administration who had come to her farewell party on 25 March. For almost 31 years Carmen Schweetz worked as university lecturer teaching physics lab courses and as departmental safety officer. She also took on several tasks in the academic self-administration over the years. Dr Tobias Breuer, who as a long-standing colleague thanked her warmly for her work and presented her with a farewell gift from her colleagues, expressed what everyone appreciates about Carmen Schweetz: her great commitment, her helpfulness, her reliability and her high sense of responsibility. However, as she herself admits, she is now happy to hand over her responsibilities as a safety officer in particular and is looking forward to having more time for her hobbies. Still, she will not turn her back on the department entirely. As a lecturer, she will still be teaching lab courses for a while.

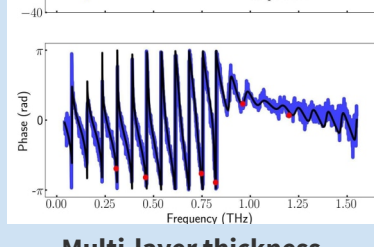
Mit einem Lächeln und einer Träne im Auge feierte Dr. Carmen Schweetz am 25.03.2025 mit rund 35 Kolleginnen und Kollegen aus dem Fachbereich und der Hochschulverwaltung den Beginn ihres Ruhestandes. Fast 31 Jahre lang war Carmen Schweetz als Hochschuldozentin in der Lehre für Physik-Laborkurse und als Sicherheitsbeauftragte des Fachbereichs tätig. Auch in der akademischen Selbstverwaltung hat sie im Laufe der Jahre verschiedene Aufgaben übernommen. Dr. Tobias Breuer, der ihr als langjähriger Kollege herzlich für ihre Arbeit dankte und ihr ein Abschiedsgeschenk der Kollegen überreichte, brachte zum Ausdruck, was alle an Carmen Schweetz schätzen: ihr großes Engagement, ihre Hilfsbereitschaft, ihre Zuverlässigkeit und ihr hohes Verantwortungsbewusstsein. Allerdings gibt sie, wie sie selbst zugibt, vor allem ihre Aufgaben als Sicherheitsbeauftragte nun gerne ab und freut sich darauf, mehr Zeit für ihre Hobbys zu haben. Dennoch wird sie der Abteilung nicht ganz den Rücken kehren. Als Dozentin wird sie noch eine Zeit lang Laborkurse geben.

Samad Razzaq completed his PhD in March 2025 with the *Ab initio* Energy Materials group under Prof. Stefan Wippermann. His research explored the atomistic physics of topological excitations in low-dimensional materials, focusing on monoatomic indium nanowires on silicon as a prototypical model system. Samad developed a microscopic theory of chiral solitons – localized wave-like distortions that connect different charge density wave phases and carry quantized charge. Using *ab initio* molecular dynamics simulations and experimental data, he revealed how these topological solitons arise from strong electron-phonon coupling and how their interactions follow well-defined algebraic rules. His work opens up new possibilities for soliton-based logic operations and quantum devices beyond traditional electronics.

Samad Razzaq promovierte im März 2025 in der AG *Ab initio* Energiematerialien unter der Betreuung von Prof. Stefan Wippermann. Er untersuchte die atomistische Physik topologischer Anregungen in niederdimensionalen Materialien am Beispiel monoatomarer Indium-Nanodrähte auf Silizium – einem prototypischen Modellsystem. Samad entwickelte eine mikroskopische Theorie chiraler Solitonen – lokalisierter wellenartiger Verzerrungen, die verschiedene Phasen von Ladungsdichtewellen verbinden und quantisierte Ladungen transportieren. Mithilfe von *ab initio* Molekulardynamiksimulationen und experimentellen Daten zeigte er, wie diese topologischen Solitonen durch starke Elektronen-Phonon-Kopplung entstehen und wie ihre Wechselwirkungen wohlgeordnete algebraische Regeln befolgen. Seine Arbeit eröffnet neue Perspektiven für solitonbasierte logische Operationen und Quantenbauelemente jenseits klassischer Elektronik.

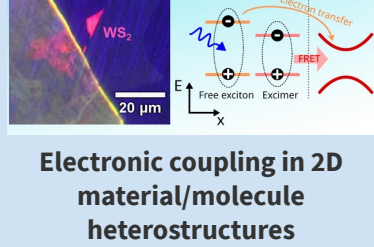
On 5 and 12 March, the protocol writing workshop took place for all participants in the basic practicals. As part of the "More (for) female physics students" project, Nadja Voermanek and Merle Rake supported the students in writing the analyses for their practical experiments. Around 20 to 25 students were present on both dates, some of whom were busy drawing diagrams, calculating errors and writing their protocols until late into the evening. With such concentrated work, the right nourishment is of course essential. Various snacks and tea were provided in advance, so that we spent two productive but also cosy afternoons in the seminar room at Renthof 5.

Am 05. und 12. März fand die Protokollschreibwerkstatt für alle Teilnehmenden der Grundpraktika statt. Im Rahmen des Projektes „Mehr (für) Physikstudent:innen“ haben Nadja Voermanek und Merle Rake die Studierenden beim Schreiben der Auswertungen für ihre Praktikumsexperimente unterstützt. An beiden Terminen waren ca. 20 bis 25 Studis anwesend, die teilweise auch in die späten Abendstunden fleißig Diagramme zeichneten, Fehlerrechnungen aufstellten und ihre Protokolle schrieben. Bei so einem konzentrierten Arbeiten darf die richtige Nervennahrung natürlich nicht fehlen. Für diverse Snacks und Tee war vorab gesorgt worden, sodass wir insgesamt zwei produktive, aber auch gemütliche Nachmittage im Seminarraum des Renthof 5 verbracht haben.

[read more](#)


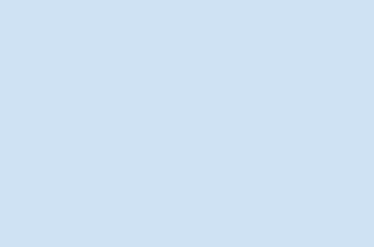
Towards wafer-scale 2D material sensors (AG Malic)

The unique properties of two-dimensional (2D) materials bring great promise to improve sensor performance and realise novel sensing principles. However, to enable their high-volume production, wafer-scale processes that allow integration with electronic readout circuits need to be developed. In this perspective, we review recent progress in on-chip 2D material sensors, and compare their performance to the state-of-the-art, with a focus on results achieved in the Graphene Flagship programme. We discuss transfer-based and transfer-free production flows and routes for complementary metal-oxide-semiconductor integration and prototype development. Finally, we give an outlook on the future of 2D material sensors, and sketch a roadmap towards realising their industrial and societal impact. This work was published in **2D Materials**.

[read more](#)


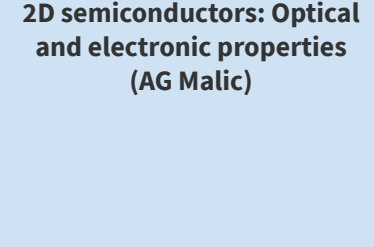
Multi-layer thickness determination using THz spectroscopy (AG Koch)

The Koch research group, in collaboration with the "Terahertz Sensors and Systems" group at the Heinrich Hertz Institute in Berlin, has developed an innovative method for ultrafast determination of layer thicknesses in multilayer samples. This technique can for example be used for high-precision inline analysis of automotive paints during ongoing production in the industry, allowing individual layer thicknesses to be measured thousands of times per second. This is achieved through spectroscopy of the sample at a small number of selected terahertz frequencies. To ensure time-efficient and cost-effective data evaluation, the Koch research group has also developed an optimization algorithm specifically tailored to this problem. The method achieves a runtime of less than one millisecond while maintaining an accuracy comparable to a full-bandwidth analysis. Initial experimental studies on three-layer samples have demonstrated that this method can achieve a standard deviation of layer thicknesses of less than 5 µm. This work has been published in **Optics Express**.

[read more](#)


Electronic coupling in 2D material/molecule heterostructures (AG Gerhard, AG Koch, AG Heine)

Semiconductor heterostructures bear the potential of merging the benefits from different material classes. For example, organic semiconductors are excellent light absorbers and transition metal dichalcogenides offer good electronic transport properties. Heterostructures of both materials could play a role in solar cells or chemical sensors, but they have been little researched to date. The present study is a collaboration between AGs Gerhard, Koch and Heine (Chemistry department) and addresses heterostructures of atomically thin layers of tungsten disulphide (WS₂) with pyrene-based ionic molecular single crystals, allowing for a well-defined orientation of the molecules at the WS₂ interface. Time- and polarization resolved photoluminescence studies reveal efficient population transfer from the organic compound to WS₂ and a weakly emissive signature, which could arise from an interfacial state, suggesting efficient electronic coupling between the layers. Moreover, polarized emission of WS₂ in the heterostructure is found, potentially originating from a template effect. The work was recently published in **RSC Applied Interfaces**

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2D semiconductors: Optical and electronic properties (AG Malic)

In the last decade atomically thin two-dimensional materials have emerged as a perfect platform for studying and tuning light-matter interaction and electronic properties in nanostructures. The optoelectronic properties in layered materials such as transition metal dichalcogenides (TMDs) are governed by excitons, Coulomb-bound energy-hole pairs, even at room temperature. The energy, wave function extension, spin and valley properties of optically excited conduction electrons and valence holes are controllable via multiple experimentally accessible factors such as layer number, varying atomic registries, dielectric engineering as well as electric and magnetic fields. This results in a multitude of fascinating physical phenomena in optics and transport linked to excitons with very specific properties, such as bright and dark excitons, interlayer and charge transfer excitons as well as hybrid and moiré excitons. In this book chapter, AG Malic in collaboration with Bernhard Urbaszek (TU Darmstadt) introduces general optoelectronic properties of 2D materials and energy landscapes in TMD monolayers as well as their vertical and lateral heterostructures, including twisted TMD hetero- and homobilayer bilayers with moiré excitons and lattice reconstruction effects. We review the recently gained insights and open questions on exciton diffusion, strain- and field-induced exciton drift. We discuss intriguing nonlinear many-particle effects, such as exciton halo formation, negative and anomalous diffusion, the surprising anti-funneling of dark excitons. The work was published as book chapter in **Comprehensive Semiconductor Science and Technology**.

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Events

Let's Talk!
Wednesdays 12-2 pm

The project "More (for) female physics students" has launched new offers for this summer semester: An open consultation hour, "Let's Talk!", offers counselling for individual questions about studying for all physics students (m/f/d). This takes place every Wednesday from 12 to 2 pm in room 04 009A, Renthof 5 (next to the didactics kitchen), alternately with the student assistants Merle (Bachelor) and Nadja (Bachelor).

Let's Zettel!
Mondays 4-6 pm

"Let's Zettel" is offered weekly at the beginning of the semester and then every 14th day on Mondays from 4 to 6 pm in the seminar room in Renthof 7 (03002) by Merle and Nadja. Here you can solve your weekly notes together or find a study group. On one of the last dates we will talk about good exam preparation.

Physics Summer Party
24 June

Physics Summer Party on 24 June from 3 pm on the yard behind Renthof 7.

Noeks conference
8-12 September

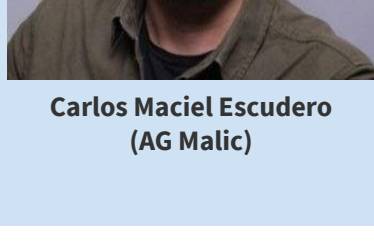
The 17th Noeks conference will take place in Marburg from the 8th to the 12th of September.

New Colleagues



Eleonora Kraus (AG Malic)

I began my PhD in April 2025 in the research group "Ultrafast Quantum Dynamics" in Marburg. Before that I recently completed my Master's Degree in the same group, where I studied polaritons and the strong coupling regime in structures composed of TMDs and photonic crystals by describing them with coupled mode theory and rigorous coupled wave analysis. In my free time I enjoy playing the guitar, board/card games and doing outdoor-sports.



Carlos Maciel Escudero (AG Malic)

After completing a bachelor's and master's degree in physics and engineering in Mexico, I traveled to the Basque Country to pursue a PhD in the physics of nanostructures and advanced materials. There, I worked on topics related to near-field spectroscopy and strongly coupled light-matter systems, obtaining my degree in 2024. Since January 2025, I have been a member of the Ultrafast Quantum Dynamics group, and in October 2025, I will start as a Humboldt Postdoctoral Fellow to study excitons strongly coupled to photons and phonons. I am excited to collaborate with colleagues and enjoy life in Marburg.

Share your good news

Your newsletter team: Carina Hlavaty, Oliver Rehnwald, Ermin Malic

Send us an e-mail with a short text and a nice foto to newsfb13@physik.uni-marburg.de

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